Liberating Clocks

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Liberating clocks: developing a critical horology to rethink the potential of clock time

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Introduction

When trying to imagine a new time, a transformed time, a way of living time that is inclusive, sustainable or socially-just – a liberatory time – it is unlikely that a clock will spring to mind. If anything, the clock has become the symbol of all that has gone wrong with our relationship to time. This general mistrust of the clock is well-captured by literary theorist Jesse Matz who observes:

> Clock time was the false metric against which Henri Bergson and others defined the truth of human time. Modernists made clocks the target of their iconoclasm, staging clocks' destruction (smashing watches, like Quentin in *The Sound and the Fury* [1929]) or (like Dali) just melting away, and cultural theorists before and after Foucault have founded cultural critique on the premise that clock time destroys humanity.[1]

Thus, across a wide range of cultural forms, including philosophy, cultural theory, literature and art, the figure of the clock has drawn suspicion, censure and outright hostility. When we compare this to attitudes towards maps, however – which are often thought of as spatial counterparts to clocks – we find a remarkably differently picture. While maps have been shown to be complicit with power,[2] they are also widely recognised as objects that can be critically reworked in the service of more liberatory ends.[3] Indeed utilising some kind of mapping, such as collaborative mapping,[4] participatory GIS,[5] or counter-mapping,[6] is often central to the work of diverse social movements and participatory projects. In the case of maps then, despite the questionable range of uses to which they have been put, they are nonetheless understood as having the potential to be critical tools that can help rework and reorient our relationship with the world around us.

In contrast, it is rare for clocks to appear in repertoires of critical, participatory or activist methods. There is no 'collaborative clocking' or 'counter-clocking'. Instead, the clock continues to symbolise capitalist forms of control and domination, as well as the constraining of progressive impulses more generally. This paper seeks to counteract these tendencies and argues that clocks have many more interesting possibilities than they are usually given credit for. Like maps, they too have complex relations to social life. Even further, they also have the potential to be reworked as creative responses to a host of

social, political and environmental issues. As a result I argue that when seeking to make interventions into the time of politics and of social life we would benefit from paying closer attention to the complex ways clocks and clock time are constructed, while also starting to experiment with making more of our own.

As a first step in my argument, I suggest one explanation for why clocks are not generally approached with the similar sense of possibility that maps are. Specifically, I look to continental philosophy as an area that often informs discussions of time and its relationship to politics. I argue that within these literatures there has too often been a dismissal of clocks as unworthy of further analysis, and that this has been based upon an inadequate understanding of how clocks operate. That is, while in human geography maps have been treated as key manifestations of the interplay between power, inscription, material objects and social life, continental philosophers have either read clocks as straightforward representatives of an 'objective' or 'universal' time, or barely mentioned them at all. Thus, after outlining examples in the work of Bergson, Edmund Husserl and Martin Heidegger, I argue that their critiques of the clock, for flattening out the time of experience, in fact rely upon reductive accounts of clock time itself. In particular, their discussion of clocks primarily in terms of measurement misses the fundamentally political nature of any standardised device, while their treatment of clock time as an unending series of nows is overly-idealised. By looking at two cases where clock time has come under fierce debate, I highlight the ways it is better understood as non-uniform, embedded within politics, and, most importantly, open to transformation.

Thus in the second half of the paper, taking inspiration from critical cartography, I call for the development of a 'critical horology'. This interdisciplinary endeavour would encourage more curiosity and criticality around clocks, as well as seek to challenge the simplified epochal narrative around clock time and socio-economic change that is dominant across much of the arts, humanities and social sciences. Given the interests of this paper, however, I focus more deeply on a further key task of a critical horology, namely to support experimentation with the form of the clock. For anthropologist Kevin Birth, the dominant forms of clocks offer just one way of dealing with some of the key cognitive challenges around time and timing. Rather than telling time objectively, he argues that clocks are best seen as responses to debates over time, debates which can be responded to otherwise.[7] Within this broader horizon for conceptualising the construction and use of clocks, the remainder of the paper discusses the potential for 'temporal design', a design approach that has been developed by designers Larissa Pschetz, Chris Speed and myself. Gathering together exemplary work by artists, designers and activists, I show that clocks are not fundamentally tied to linear and objective time, or even necessarily capitalist time, but instead have the potential to be redesigned as part of challenging and transforming dominant understandings of time.

The time that 'destroys humanity': clocks and continental philosophy

Continental philosophy is arguably a field that many turn to when seeking to develop a better understanding of 'the time of our lives,' as David Couzens Hoy has put it.[8] Indeed Jack Reynolds has suggested that one of the core criteria for being a continental philosopher is a 'concern with the inter-relation of time *and* politics'.[9] As such, it is common to expect that in order to develop a stronger grasp on these issues at least some time will be spent with the work of philosophers such as the already mentioned Bergson, Husserl and Heidegger, as well as others such as Walter Benjamin, Jacques Derrida, Gilles Deleuze and Bernard Stiegler. When one turns to them for critical perspectives on clocks and clock time, however, their work offers us very little purchase on the problem. Indeed what is striking when one looks for clocks within continental philosophy is that for all the threat they represent, it turns out that, with the exception of Heidegger and Stiegler, very little, if anything, is said specifically about them. Searching for the word 'clock' in a range of key historical and contemporary texts in the area reveals that it often barely receives a mention.[10] To revisit the analogy with geography, this would be like surveying the discipline's core literatures on the experience of space and finding barely any discussion of a map. Indeed, the tendency has been to avoid the clock almost entirely as a route to thinking through the time of politics and ethics in favour of a focus on concepts such as 'the untimely,' 'the event,' or 'the time of becoming.' Moreover, when clocks are discussed, core works in this field draw on a flawed view on what clocks are, how they operate and the kinds of time they tell. More specifically, they incorrectly assume that clocks are objective tools of measurement (and thus removed from the field of political action), and are inherently tied to a time understood as an isochronic series of nows (and thus unable to represent time in more complex ways).

A good way to see these assumptions at work is in those passages where clocks are most likely to appear, namely in discussions around the relationship between subjective or experiential time and objective or public time. While the non-linear character of experienced time is a central issue for continental philosophers, the problem also arises of how these accounts of temporality relate to the time of the world. At stake is the question of whether experienced time should be understood as a kind of ephemeral subset of 'universal' or 'cosmological' time, or alternatively that the time of the world may in fact rest upon a more fundamental experiential time. Due to the assumption that clock time and universal time can be treated as if they are synonymous, a frequent strategy for responding to the problem of the relationship between experienced time and universal time is to develop a phenomenological analysis of the act of telling the time via a clock. Since the clock is assumed to be the legitimate emissary of an objective time, this act is thought to bring both types of time into an analytically useful relationship. In order to illustrate this, I will now look at three examples of this kind of analysis.

For Bergson, the time of the experiencing subject should be understood in terms of

duration, that is, as multiple qualitative states that 'melt' into each other. In order to show that the general conception of time is inadequate (specifically scientific time), Bergson turns to the clock for an illustration. In his first mention of the device (halfway through *Time and Free Will*), he writes that 'when I follow with my eyes on the dial of a clock the movement of the hand which corresponds to the oscillations of the pendulum, I do not measure duration, as seems to be thought; I merely count simultaneities, which is very different'.[11] In a move that will be echoed in Husserl and Heidegger, Bergson argues that on its own a clock cannot tell time since all it indicates are punctuations or individual positions on the dial. These points or positions only become meaningful insofar as a consciousness creates a particular kind of spatial imaginary that can preserve past positions in its memory and thus string them together in a line of succession.[12] Here is our first example then of the clock that 'destroys humanity' by drawing us away from qualitative time, since for Bergson clocks can only tell a time that is time as quantitative and spatialized. At this stage, let us simply note two points. First, that for Bergson, clocks are straightforwardly assumed to act as a stand in for the time of astronomers and physicists that he would like to critique,[13] and secondly despite all the aspects of a clock that might be analysed (e.g., the designed object, the choice of which system of hours to use, what it is calibrated to, how it is used in practice) the act of looking at the dial is reduced to 'merely counting'.

Turning to Husserl, we find an even stronger example of the reductive treatment of clocks. Indeed at various points they are placed outside the legitimate field of analysis altogether. Husserl does include clocks when arguing for the primacy of experienced time, similarly suggesting that recognising the passing of intervals via a clock relies on an observer whose own time is not caught up within a pure succession of instants. As Nicholas de Warren explains, a clock could not be 'read' if we simply saw it in terms of hands pointing towards various numbers. Instead 'at the moment in which I notice the hand on "7," I must grasp that the *same* hand *was* at "6" and relate where the hand once was to where the hand now is'.[14] However, more generally, Husserl argues that clocks 'fall to the proscription of the phenomenological reduction'.[15] The time he is interested in 'is not an objective time and not a time that can be determined objectively. This time cannot be measured; there is no clock and no other chronometer for it'.[16] Despite any legitimate reasons for this move within Husserl's frame of argumentation, what I want to again highlight is the way that clocks are treated, above all else, as measuring devices, as tools for telling 'objective time' and as falling outside the proper purview of philosophical inquiries into time.

Finally, and largely in keeping with the analyses of Bergson and Husserl, Heidegger reads clocks primarily in terms of an objective 'world time', describing it as a '"universally" accessible' time that is 'found as an *objectively present multiplicity of nows*'.[17] Further the clock appears, primarily, in order to assert that the significance of clock time only arises in reference to a more fundamental experiential time. In this case, the clock's series of nows becomes significant not simply in following the movement of a pointer, but more fully in

reference to the viewer's own sense of the present moment or 'now-saying'.[18] As Françoise Dastur explains: 'I can only read time off the clock by referring to the "now" that I am, which comes from a temporality which is "mine" and which pre-exists all instruments intended to measure it'.[19] Despite these similarities with Bergson and Husserl, Heidegger's analysis does differ in that it offers a more detailed and complex account of clocks, including a historical account of the development of methods for counting and measuring time. Indeed in a footnote, Heidegger calls for 'further investigation' into the histories of calculated time.[20] A rereading of Heidegger's work, may therefore offer ways of thinking about clocks in broader ways. Even so, arguably the dominant reception of this work has not adequately disputed Heidegger's emphasis on counting and measurement. Even Stiegler's work, which criticises the exclusion of technics from philosophy, takes issue with Heidegger's negativity towards the clock's 'exactitude of measure', not in order to offer a broader account of what clocks signify or how they operate, but in order to rehabilitate attitudes toward exactitude.[21]

The accounts discussed here are complex, and would need more room to do justice to them than is available in this paper. However, the two key points that I want to highlight are first, that in these works clocks appear precisely when the authors are seeking to describe the time they are taking issue with. In each case the time of the clock is shown to be reliant on elements of experienced time and the common assumption that clocks are the true arbiter of time is critiqued. Second, clocks are portrayed as devices that obscure more complex understandings of time through their emphasis on indicating points along a uniform and linear series of successive simultaneities. As Heidegger argues, the 'vulgar interpretation' of time given to us by the clock 'levels down' time into a succession of nows that is 'uninterrupted and has no gaps'.[22] As a consequence, even while more critical readings may potentially offer other ways into the issue, the overall message of this work is that clock time hides our true nature as temporalising beings, and clocks themselves should be understood as a perilous distraction from an authentic engagement with this temporality.

In terms of our interest in the transformative potential of clocks, then, this suggests that within continental philosophical accounts the clock is so strongly associated with a problematic 'objective time' or 'world time' that it appears to be practically irredeemable as a critical tool or device. Perhaps it is little wonder then that clocks are absent from later phenomenologically-inspired discussions of the time of social, political and ethical transformation. Indeed the assumption that clocks can act as a shorthand for the kind of time an author is *not* interested in continues into the present day.[23] For example, in setting out the key terms for his history of time in continental philosophy Hoy wrote that the 'term "time" can be used to refer to universal time, clock time, or objective time. In contrast, "temporality" is time insofar as it manifests itself in human existence'.[24] As with Husserl, for Hoy clocks appear to fall out of the sphere of concern and are understood as somehow apart from 'human existence.' However, as I have already suggested, this dismissal is based on a fundamental misunderstanding of how clocks work, as well as a strange lack of

curiosity about these devices that are so influential.

Clock time as 'objective time'?

In the above accounts clocks are talked about in terms of objectivity, calculation, measurement and exactitude. For many readers this might make perfect sense. However, if this were a discussion of maps, and we were describing them as 'merely' tools for calculating direction and distance, I suggest there would be much more discomfort. Describing maps as representing 'objective space' is not as easily accepted as Hoy's equating of clock time and objective time. To be objective is commonly understood as being able to represent the facts of a situation in an impartial or detached way. We know that this is not what maps do in relation to space, and, despite widespread assumptions to the contrary, neither do clocks do this in relation to time. Clocks are not apolitical, or immune to debates and opinions. Within the social sciences there is a variety of work that demonstrates this, some of which I will discuss later on in the paper. However to highlight this most clearly, and given my concern with the influence of continental philosophical approaches in particular, I want to offer examples of how an analysis of a subject looking at a clock might be developed otherwise. These examples demonstrate that in discussing the relationship between objective time and experienced time, the above accounts have themselves engaged in a levelling or flattening down of time, specifically clock time. My readings will challenge the notion of clock time as an uninterrupted flow, and instead highlight the significance of attending to the gaps and breaks it is subject to.

Again, it is hardly an unsympathetic move to claim that clocks tell time in a detached way. Their relentlessly turning hands have become a familiar way of representing the cruel disconnects between the 'time of experience' and the 'time of the world' – the hand that continues on even though a loved one has died, refuses to pause when we are late, or rebuffs pleas to skip ahead when we are anxiously waiting. In many ways, however, these depictions draw on an idealised version of clock time that is not apparent in practice. Clocks are late, they are fast and they can fail to match up with each other. We change them when we shift time zones, for daylight saving time (DST) or even just when we want to trick ourselves into getting up earlier. Further, clocks do not represent a single line of time. The time that we currently call clock time is Universal Coordinated Time (UTC), which is itself derived from an effort to coordinate two other time standards, namely International Atomic Time (TAI) and Universal Time (UT1). Along with others such as GPS Time (GPST), these time standards produce different kinds of time that are derived from different phenomena, flow in different ways and do not always match up. To call clock time a 'levelled down succession of nows', as Heidegger does, is to flatten out this complexity, and to overlook the variety of ways that people actively edit and redefine clock time(s). To see what I mean here I will look at DST and UTC more closely.

So let us return to the subject observing the clock, but this time we will situate her in a

specific place and time, i.e. the U.K. on the 29th of March 2015 at 12:59 am. If she is watching the clock on her mobile phone or computer she will see the time jump to 2:00am, rather than continue steadily on to 1:00am, in order to move into DST. Importantly, while Heidegger's history of calculated time problematically suggests that changes occur through a 'progressive understanding of nature',[25] DST in fact arose out of debates over what social benefits clock time might provide. When it was first proposed in the early 1900s, medical professionals emphasised health benefits, business leaders wanted their employees to make greater use of the recreational facilities they provided, and companies welcomed savings on lighting costs.[26] Many others, however, disagreed vehemently with the changes. The sheer contentiousness of the proposal was played out in protests, pamphlets, speeches, and editorials and, despite repeated bills in parliament, it was not until the onset of World War I that it was implemented in the UK in response to the German use of DST in 1916. Anyone looking into the history of DST will see that it ties clock time to world wars, resource crises, nationalism, regionalism, legislative processes and more. In mobilising broad sets of constituencies to engage in debates over the constitution of clock time, it also illustrates the range of contradictory meanings and applications of clock time that can co-exist within societies. In short, DST provides one reason why clock time cannot be used as a stand-in for universal time, since here one could argue that the roots of clock time do not exist in a simple act of measurement, but rather in debates over how competing interests and concerns should be addressed.

One might want to object, however, that DST is not what we would properly call 'clock time' but is instead a (still) contentious method of meddling with it. Might not the time underlying DST still be impartial and detached? Again the answer is no. To see why this is the case, let us return to our experiencing subject watching the clock, but now it is the 30th June 2015 at 11:59:59pm (UTC). If all goes correctly she will see the clock read 11:59:59pm, then 11:59:60pm, then 12:00:00am, that is she will see the insertion of a leap second.[27] These seconds are added into UTC in order for it to keep roughly in line with both TAI and UT1. While TAI is relatively stable, UT1 is calculated in reference to the rotation of the earth. Because the earth's rotation is not constant, UT1 and TAI are not synchronous. Thus, in order to provide a timescale that has the steady beat of atomic time and yet also maintains a close relation to the rotation of the earth, leap seconds are inserted at non-standard intervals into a third timescale – UTC. These additions are not predictable in advance but depend upon whether the rotation has slowed or speeded up. While this demonstrates that clock time needs to be understood as being subject to glitches and gaps, it also again returns clock time to the realm of politics.

This is because the practice of leap seconds, like DST, is a contentions one. Currently, the International Telecommunications Union, which sets the standards for global time-keeping, is debating whether the practice should be retained. When a leap second was added to UTC in 2012 there were a range of high-profile systems failures associated with it. This included

failures of websites such as Yahoo and Reddit, as well as Qantas' airline booking systems.[28] Systems that rely on digital timestamps work more smoothly with a timescale that is not subject to unpredictable additions requiring manual corrections. If leap seconds are not added correctly, IT systems are not able to communicate with each other properly and thus fail. As a result those involved in areas such as navigation, satellite communication and electronic network synchronisation are calling for a 'continuous reference timescale' that would eliminate the leap second and the issues related to it.[29] Others are in favour of retaining the current version of UTC, however, since many systems already in place, such as astronomical systems, including robotic or automated observatories, or observational data archives are designed to work with the current definition and it would be costly to change them.[30]

In both the DST and the leap second debates, there are calls for a consistent, continuous time, much like the one that continental philosophers attribute to clocks. However in neither case is this what clocks tell, instead this is what many *hope* will be provided. Importantly, these debates are less about determining the objective nature of time than about figuring out what kind of time will work best for which groups of people. For example, in regard to DST, while the editors of *Nature* argued that changing clock time was as unreasonable as changing the definition of temperature depending on the season,[31] others pointed to the artificiality of the clock time that was already in place. Astronomer Robert Ball, for example, argued that 'meridians were made for man, not man for meridians. Time must be regulated…to suit man's convenience'.[32] We find a similar sentiment in leap second debates, where R.A. Nelson *et al*. point out in their 2001 review that, 'throughout the history of time measurement, from sundials to atomic clocks, time scales have always been established by taking into account prevailing technology and needs'.[33] Indeed, a key concern in the leap second debate is not that time might become less 'objective' but that, because there are multiple timescales available, those who are not happy with UTC might simply choose to use another one.[34] As a result, Nelson *et al*. argue that 'we should perhaps not be too hesitant in adapting to modern technology and modern needs'.[35] Thus a closer analysis of these two seemingly insignificant glitches, reveals a fundamental flaw in continental philosophical accounts of clock time. Far from acting as a surrogate for an objective universal time, clock time, for those in charge of defining and maintaining it, is a malleable construct that has the capacity to adapt and respond to the changing needs of users.

To sum up – phenomenologically-inflected approaches to the time of our lives are highly influential, and yet, for the most part, they have taken clocks at face value. Analyses of time telling practices have too often been limited to an individual's experience of looking at an abstract dial, and there has been a lack of curiosity about how clock time is actually produced. (For example, given Stiegler's interest in *ēpimēthia* or 'knowing after the fact', and the notion of 'real time', one wonders what he might make of the fact that UTC is a timescale that cannot tell us 'the real time' *in real time*. Those who produce it describe it as

a 'post-processed timescale that is available monthly with a delay of about ten days after the last date of data'.[36]) With these limited and incurious readings, the complexities of clock time have been flattened out and critiques have focused on an idealised version of the clock that we do not find in practice. When we look more closely, we are reminded that clock time is subject to intense debate, that it can be changed and redefined, and that these changes are widely accompanied by confusions and adjustments that are technical, but also embodied, personal, social and political. These are debates that philosophers are largely absent from.[37] By failing to question presumptions about what clock time is, continental philosophical approaches in particular have been deprived of a rich vein of investigation. Moreover with even very recent work retaining the idea that 'objective' time and clock time are synonymous, we have found ourselves in the strange position, as Birth has also noted, of finding scholars in the humanities holding 'on to positivist absolutes' and scientists arguing for a time that is dependent on context.[38] As a result, one of the key areas of thought that many turn to in order to understand the politics of time has failed to adequately engage with core struggles over how humans should (or should not) shape time. A commitment to the transformational politics of time thus requires that the clock be recalled from its banishment and analysed anew.

Moving towards a critical horology

To facilitate a rethinking of the potential of clocks in social life, I would argue that we need a *critical horology* to complement the already existing critical cartography. Horology, or the study of the principles and methods for making clocks, currently focuses on technical questions, methods of repair and reconstruction, and the history of devices used to tell time (often narrowly defined).[39] In contrast, while cartography has traditionally focused on the technical aspects of mapmaking, the development of critical cartography challenged the narrowness of this focus. As Jeremy Crampton and John Krygier argue, the development of two key areas, namely a 'pervasive set of imaginative mapping practices and a critique highlighting the politics of mapping', has led to an 'undisciplining' of cartography that has opened it up to much wider approaches.[40] With the more wide-spread understanding of maps as 'specific set[s] of power-knowledge claims' it became easier to grasp that 'not only the state but others could make competing and equally powerful claims'.[41] Thus the 'critical' in critical cartography borrows from the Frankfurt School and 'examines the grounds of our decision-making knowledges;…the relationship between power and knowledge from a historical perspective; and…resists, challenges and sometimes overthrows our categories of thought'.[42] Borrowing from this approach, a *critical* horology would support a deeper exploration of the grounds upon which clocks and clock-time are produced, the relationships both have with power (in the present and historically), and an opening up of who might experiment with the possibilities and potentialities of the clock.

To facilitate this rethinking multiple steps are required. One of these will be to gather together critical work on clocks from across the disciplines. In history, sociology and

anthropology, for example, there has been a wide range of work that has situated the clock at the centre of key political struggles over the last few centuries. So although the clock-focused counterpart to Denis Wood's influential *The Power of Maps* has yet to be written, classics such as Lewis Mumford's *Technics and Civilisation*,[43] E.P. Thompson's 'Time, Work-Discipline, and Industrial Capitalism',[44] and David Landes' *Revolution in Time: Clocks and the Making of the Modern World*[45] have turned attention to the socio-economic role of clocks. Even so, the dominant narrative that has arisen from this work still retains a flattening out of clock time and its role in social life. In particular, the story of epochal shifts from a task-based time to clock-based time, then to an accelerated and globalised digital network time (which is repetitively retold across the arts, humanities and social sciences) has not been reworked as new research has become available. As more recent research shows, clock time was a highly significant aspect of time-telling prior to the industrial revolution,[46] railway companies blocked the creation of national time systems rather than being the reason for them,[47] and accounts of speeded up societies overlook the inequalities of temporal labour.[48] Further, time-standards did not usher in an era of global uniformity,[49] nor did they fully replace local time customs.[50] As a result, a reworked and more critical narrative of the complicated role of clocks in social life still needs to become widely accepted.

Of most importance for our argument, however, is a deeper understanding of the way that clocks are not fundamentally about measurement, but are produced through choices over competing social needs. Here Birth's wide-ranging work provides a pre-eminent guide. For example, he points out that 'the fundamental standard of time is defined not measured'.[51] Further, he argues that 'the artifactual determination of time does not represent a coherent, consistent cultural system…but represents instead the sedimentation of generations of solutions to different temporal problems'.[52] As has already been argued, clocks do not tell a single time but participate in the 'hodgepodge of different logics' that characterise time standards more generally.[53] For example, Birth elsewhere sets out the way that 'clocks address three distinct cognitive challenges: (1) the generation of uniform short intervals, or isochronism; (2) the representation of long intervals based on the scalability of the short intervals; and (3) the determination of points in time'.[54] In other words, (standard forms of) clocks provide a regular beat (in the form of uniform seconds, minutes and hours), while also indicating duration (the length of time between two or more events), as well as signalling specific moments in time (e.g. the right time to start work, or the last moment when a job application can be submitted).[55] While dominant forms of clocks currently combine these multiple modes of time-reckoning into a single device, in other cultures and contexts they are dealt with in a variety of different ways. Through a greater recognition of this it becomes possible to claim, as Birth does, that: 'Every clock tells a story. Every clock takes a position in a debate about time. Every clock is an attempt to shape how people think about time'.[56] Highlighting the politics of clocks in this way, would then support a further step for a critical horology, namely developing its own take on the possibility of a 'pervasive set of imaginative *clocking* practices'.

Temporal design

Following Birth, clocks are artefacts that are *designed*, they can therefore be *redesigned*. That is, clocks do not need to be produced in only one form, but could be remade to respond to temporal challenges in new ways. Granted, the trope of the standard clock has a strong hold over cultural imaginations. Online image searches for 'time', for example, return pages and pages of standard clock faces. This suggests that the clock face has become so tied to dominant ideas of time in Western cultures that there may be little room to shift its semiotics.[57] Even so, the idea of liberation, with which we started this paper, may be able to do some interesting work for us here. After all, to liberate something is not just to set it free, but also to misappropriate it, to steal it or take it back. Indeed, despite the lack of theoretical interest in the malleability of clocks, activists, artists and designers have worked with clocks in ways that suggest intriguing possibilities for creative intervention. This field of design, which designers Larissa Pschetz and Chris Speed, and myself, have called *temporal design*, draws on critical approaches to clocks and speaks back to their dismissal as hopelessly irredeemable. Instead, drawing on Pschetz's PhD work, we argue that those interested in redesigning clocks should seek to use them to:

1. identify dominant narratives, including the forces and infrastructures that sustain them or which they help to support;
2. challenge these narratives, e.g. by revealing more nuanced expressions of time;
3. draw attention to alternative temporalities, their dynamics and significance;
4. expose networks of temporalities, so as to illustrate multiplicity and variety.[58]

Thus, in moving towards our conclusion, I will discuss a range of examples of temporal design in terms of the principles above, in order to showcase the potential for liberating clocks.

The first piece I will focus on offers an illustration of the first two principles of identifying and challenging dominant narratives of time. *Let Us Keep Our Own Noon* (2013), is an installation and performance piece by artist David Horvitz which draws attention to the historical nature of clock time. It was first exhibited at the Chert gallery in Berlin and was inspired by long-forgotten conflicts over the way time was to be measured and told. Specifically, Horvitz's piece retrieves the idea of 'local time'. Prior to the implementation of standardised time zones, many cities in North America, Europe and elsewhere used local solar time, meaning that each had their 'own noon'. The piece involved melting down a clock bell (cast in 1742) to create a number of smaller bells. These bells are exhibited as an installation, but are also used in a performance by volunteers who start ringing the bells at local noon (e.g. 12:49pm EST at the New York installation in 2014). Volunteers then disperse out into the city with the bells, taking 'local time' outside of the gallery and into the public realm once more. The title for the piece was taken from a nineteenth-century pamphlet protesting the move towards standardised time zones. At the time there were many objections to shifting from the 'real' time told by the sun to the 'artificial' standardised

hours we now use. *Let Us Keep Our Own Noon* thus reminds us that the time that is now so often taken for granted was once viewed as an impostor. Even further, Horvitz calls attention to the ways that clock time has been subject to public debate. As we saw with the controversies around the implementation of DST, campaigning, pamphleteering, appeals to public opinion, and bureaucratic decision-making all have a part to play in the telling of time. The piece thus prompts us to ask what similar kinds of debates might be called for in the present.

Provocations for such debates might be furnished by works that focus attention on alternatives to mainstream clock time, speaking to the third temporal design principle. Useful illustrations come from work linked with the slow movement,[59] and particularly slow design.[60] Drawing on the ethos of slow for inspiration for both outputs and processes, such work often seeks to support more contemplative experiences, to encourage a wider environmental awareness and to reshape everyday behaviours.[61] The assumption that time is speeding up out of control has led to a number of examples of redesigned clocks. One such clock is *The Present,* which features a single hand that rotates around a dial once per year. The colours on the dial move through blues, greens, yellow and reds, representing the seasons. In explaining the impetus for the clock, its creator Scott Thrift writes that 'our whole lives we look up to the clock and see time as something that we're losing'.[62] As an alternative to this, *The Present* offers a way of rooting oneself in a time that operates on a different scale, placing the viewer in a 'present' that lasts a season rather than a second. Arguing that 'we've limited our perception to a single way of measuring time',[63] Thrift's clock reminds us that there is always more than one kind of time, and that, like those making decisions over whether to use UTC or an alternative, there may well be opportunities to choose otherwise. Importantly, Thrift's aim is not to do away with mainstream clock time altogether, but rather to introduce greater variety to the ways we use and tell time, with the holistic time of *The Present* offering a counterpoint to the segmented time of the regular clock.[64]

Recognising the multiplicity of times, as Horvitz and Scott asks us to do, raises questions about possible interactions between them, and whether this aspect of time might also be told via clocks. Here too we can find designs that respond to this problem in intriguing ways, often by addressing the final temporal design principle of 'exposing networks of temporalities, so as to illustrate multiplicity and variety.' These clocks challenge the idea that the world is subsumed within a single flow of time that is linear and all-encompassing. Revital Cohen's *Artificial Biological Clock*, for example, comments on the need for many women to negotiate multiple and conflicting times, particularly those arising from work, motherhood and new reproductive technologies. The object itself seems almost like a hybrid of medical equipment and clock movements, with tubes, gears and cables. It is accompanied by the following description: 'The clock is fed information via an online service from [a woman's] doctor, therapist, and bank manager. When these complex factors align

perfectly, the clock lets her know that she is ready to have a child'.[65] Poking fun at the idea that time could ever be understood as a single line, Cohen instead draws attention to the vagaries of embodied time, subjective time and social time. A further example is offered by Pschetz's *Family Clock* which responds to debates around work/life balance and specifically the promise of flexi-time to solve problems of family scheduling. It consists of a physical clock linked to a smartphone/tablet application which family members use to set the clock forwards or backwards in response to temporal problems encountered throughout the day.[66] A child who is late for school might move it forward, a parent bored at work might speed time up, bed-times might be moved later, or dinner time moved earlier. Importantly each of these decisions do not affect only the individual, but the family as a whole. Pschetz found that 'hosting' the clock led family members to reflect on temporal hierarchies, the relationship between time and morality and the potential for clocks to both connect and disrupt.[67] In both of these examples, clocks no longer tell 'the time' but instead ask questions about it and expose hidden complexities. They thus prompt reflexivity about the nature of time and what it might mean to change it.

The examples discussed here represent only a small sample of the innovative ways that artists, designers, activists and others have engaged with the problem of telling the time. Exhibitions have collected together interrogations of the time of labour, profit and work discipline,[68] while competitions have sought new 'climate clocks'.[69] These and other works could be collated and analysed as part of the development of the field of critical horology. For our purposes though, what is crucial is that in each of the examples above, the impartiality of the clock has been called into question. Moreover they have shown how each of the cognitive challenges of timing highlighted by Birth can be solved in alternate ways. Cohen and Horvitz demonstrated other ways of determining points in time, while Thrift questioned the impetus behind the generation of short intervals by moving from seconds to seasons. More broadly, these interventions showed how varied ways of living and understanding time can prompt the creation of new clocks. These artists and designers are doing what many have not, i.e. turning towards clocks in order to reveal conflicts with dominant forms of time and to suggest alternatives. Taken altogether these interventions suggest that far from being irredeemably tied to Newtonian time, the clock is a device that is open to a much wider range of rich re-workings than many have allowed. Indeed, what is meant by clock time can still be opened up to questioning. As Thrift argues in relation to his own design, 'living with this clock, becoming accustomed to *The Present*, is an adventure. It's an adventure in our perception of time'.[70] Far from being a collusion with a device that 'destroys humanity', attending to clocks, seeking to know more about how they work, what forces have shaped them, and how they might be remade, can offer new horizons for exploring the possibilities of liberating time.

[1] Jesse Matz, 'How to Do Time with Texts', *American Literary History*, 21, 4 (2009), 836-44, quotation p836.

[2] e.g. Jeremy W. Crampton, 'Maps as Social Constructions: Power, Communication and Visualization', *Progress in Human Geography*, 25, 2 (2001), 235-52.; J. B. Harley, 'Deconstructing the Map', *Cartographica: The International Journal for Geographic Information and Geovisualization*, 26, 2 (1989), 1-20.; Graham Huggan, 'De-Colonizing the Map: Post-Colonialism, Post-Structuralism and the Cartographic Connection', *Ariel*, 20, 4 (1989), 115-30; Denis Wood, *The Power of Maps*, New York, Guilford, 1992.
[3] e.g. Michael Brown and Larry Knopp, 'Queering the Map: The Productive Tensions of Colliding Epistemologies', *Annals of the Association of American Geographers*, 98, 1 (2008), 40-58.; Jeremy W. Crampton and John Krygier, 'An Introduction to Critical Cartography', *ACME: An International E-Journal for Critical Geographies*, 4, 1 (2005), 11-33.; Jay T. Johnson, Renee Pualani Louis and Albertus Hadi Pramono, 'Facing the Future: Encouraging Critical Cartographic Literacies In Indigenous Communities', *ACME: An International E-Journal for Critical Geographies*, 4, 1 (2005), 80-98.; Rob Kitchin and Martin Dodge, 'Rethinking Maps', *Progress in Human Geography*, 31, 3 (2007), 331-44.; Mei-Po Kwan, 'Feminist Visualization: Re-envisioning GIS as a Method in Feminist Geographic Research', *Annals of the Association of American Geographers*, 92, 4 (2002), 645-61.; Marianna Pavlovskaya and Kevin St Martin, 'Feminism and Geographic Information Systems: From a Missing Object to a Mapping Subject', *Geography Compass*, 1, 3 (2007), 583-606.
[4] L. J. Carton and W. A. H. Thissen, 'Emerging conflict in collaborative mapping: Towards a deeper understanding?', *Journal of Environmental Management*, 90, 6 (2009), 1991-2001.
[5] Christine E. Dunn, 'Participatory GIS: a People's GIS?', *Progress in Human Geography*, 31, 5 (2007), 616-37.
[6] Counter Cartographies Collective, Craig Dalton and Liz Mason-Deese, 'Counter (Mapping) Actions: Mapping as Militant Research', *ACME: An International E-Journal for Critical Geographies*, 11, 3 (2012), 439-66.
[7] Kevin K. Birth, *Objects of Time: How Things Shape Temporality*, New York, Palgrave Macmillan, 2012.
[8] David Couzons Hoy, *The Time of Our Lives: A Critical History of Temporality*, Cambridge, Massachusetts, MIT Press, 2009.
[9] Jack Reynolds, 'Time Out Of Joint: Between Phenomenology And Post-Structuralism', *Parrhesia: A Journal Of Critical Philosophy*, 9, (2010), 55-64. p55
[10] Works consulted include Edmund Husserl's *Ideas: A General Introduction to Pure Phenomenology* and *On the Phenomenology of the Consciousness of Internal Time (1893–1917)*; Henri Bergson's *Time and Free Will*, *Matter and Memory*, and *Creative Evolution*. Kant's three critiques, and collections of his political writings; Deleuze's *Cinema 2: The Time Image*, Derrida's *Given Time: 1. Counterfeit Money*, *Spectres of Marx*, *Politics of Friendship*, and *Rogues: Two Essays on Reason*; Foucault's *Discipline and Punish*.
[11] Henri Bergson*, Time and Free Will: An Essay on the Immediate Data of Consciousness*, Mineloa, N.Y., Dover, 2001, pp107-08.
[12] Ibid. pp108-11.
[13] Ibid. p107.
[14] Nicolas de Warren, *Husserl and the Promise of Time: Subjectivity in Transcendental Phenomenology*, Cambridge, Cambridge University Press, 2009, p102.
[15] Edmund Husserl, *On the Phenomenology of the Consciousness of Internal Time (1893–1917)*, Dordrecht & London, Kluwer Academic Publishers, 1999, p350.
[16] Ibid., p351.
[17] Martin Heidegger, *Being and Time: A Translation of Sein und Zeit*, Albany, SUNY Press, 1996, p383.
[18] Ibid., p382.
[19] Françoise Dastur, *Heidegger and the Question of Time*, New Jersey, Humanities Press, 1998, p3.
[20] Martin Heidegger, op.cit., p415n5.
[21] Bernard Stiegler, *Technics and Time, 1: The fault of Epimetheus*. Translated by Richard Beardsworth and George Collins, Stanford, CA, Stanford University Press, 1998, quotation pp274-275.
[22] Martin Heidegger, op. cit., p388.
[23] e.g. Nathan Widder, *Reflections on Time and Politics*, Penn State University Press, 2008, p46.
[24] David Couzons Hoy, op. cit., pxiii.
[25] Martin Heidegger, op. cit., p381.
[26] David Prerau, *Saving The Daylight: Why We Put the Clocks Forward*, London, Granta Books, 2006, pp12-14.
[27] Things don't always run smoothly. See http://www.youtube.com/watch?v=bJWGBTXLWeA and https://www.youtube.com/watch?v=RyPZldmAAG8 for examples of how various systems dealt with the 2002 leap second insertion.
[28] Charles Arthur, 'Leap Second hits Qantas air bookings, while Reddit and Mozilla stutter', *The Guardian*, 2 July, 2012, at http://www.theguardian.com/technology/2012/jul/02/leap-second-amadeus-qantas-reddit.

[29] IAU Working Group on the Redefinition of Coordinated Universal Time, 'Report of the IAU Working Group on Coordinated Universal Time (UTC)', 2014, Accessed 4th February 2015, at http://hpiers.obspm.fr/eop-pc/earthor/utc/report_WG_UTC_2014.pdf, p2.
[30] Ibid, p3.
[31] David Prerau, op.cit., p15.
[32] quoted in David Prerau, op. cit., p14.
[33] R. A. Nelson, D. D. McCarthy, S. Malys, J. Levine, B. Guinot, H. F. Fliegel, R. L. Beard and T. R. Bartholomew, 'The leap second: its history and possible future', *Metrologia*, 38, 6 (2001), 509-29, quotation p524.
[34] Users might, for example, switch to GPS time, which does not include leap seconds, or even 'a time scale maintained by an individual government contractor' ibid. p519. This could then 'lead to the proliferation of independent uniform times adopted to be convenient for particular objectives. If that happens, UTC would receive less acceptance as an international standard' ibid. Although others argue that this has always already happened, Kevin K. Birth, 'Zmanim, Salāt, Jyotish and UTC: The Articulation of Religious Times and the Global Timescale', in J. H. Seago, R. L. Seaman, P. K. Seidelmann and S. L. Allen (eds) *Requirements for UTC and Civil Timekeeping on Earth Colloquium*, held May 29-31, 2013, at Charlottesville, Virginia, San Diego, Univelt, 2013. p4.
[35] R. A. Nelson et al. op. cit., p524.
[36] E.F. Arias, G. Panfilo, and G. Petit, 'Timescales at the BIPM', *Metrologia*, 48, 4 (2011), S145-S153, quotation pS151. See also Judith Wambacq and Bart Buseyne, 'The Reality of Real Time', *New Formations*, 77, Winter (2012), 63-75.
[37] For example, searches for 'daylight saving time' or 'leap second' on PhilPapers (http://philpapers.org/) yield zero results.
[38] Kevin K. Birth, *Objects of Time*, op. cit., p118.
[39] Kevin K. Birth, 'The Regular Sound of the Cock: Context-Dependent Time Reckoning in the Middle Ages', *KronoScope*, 11, 1-2 (2011), 125-44.
[40] Jeremy W. Crampton and John Krygier op. cit., p12.
[41] Ibid.
[42] Ibid.
[43] Lewis Mumford, *Technics and Civilization*, London, Routledge, 1946.
[44] E. P. Thompson, 'Time, Work-Discipline, and Industrial Capitalism', *Past and Present,* 38 (1967), 56-97.
[45] David S. Landes, *Revolution in Time: Clocks and the Making of the Modern World*. Revised and Enlarged ed. Cambridge, MA, Belknap Press of Harvard University Press, 2002.
[46] Paul Glennie and Nigel Thrift, *Shaping the Day: A History of Timekeeping in England and Wales 1300-1800.* Oxford, Oxford University Press, 2009.
[47] Ian R. Bartky, 'The Adoption of Standard Time', *Technology and Culture* 30, 1 (1989), 25-56.
[48] Sarah Sharma, *In the Meantime: Temporality and Cultural Politics*. Durham and London, Duke University Press, 2014.
[49] Vanessa Ogle, *The Global Transformation of Time 1870–1950*. Cambridge, Harvard University Press, 2015.
[50] Kevin K. Birth, *'Any Time is Trinidad Time': Social Meanings and Temporal Consciousness* Gainesville, FL: University Press of Florida, 1999.
[51] Kevin K. Birth, *Objects of Time*, op. cit., p156
[52] Ibid., p2.
[53] Ibid.
[54] Kevin K. Birth, 'Non-Clocklike Features of Psychological Timing and Alternatives to the Clock Metaphor ', *Timing & Time Perception*, 2, 3 (2014), 312 – 324, quotateion p312.
[55] Indeed if the reader returns to the discussion of Bergson, Husserl and Heidegger, they will see all three challenges addressed but without ever being explicitly recognised as such. Bergson's simultaneities deals with isochronism, Husserl's retention deals with longer intervals, while Heidegger's now-saying deals with determination of points in time.
[56] Kevin K. Birth, 'Clocks, Politics, and Changing Times', presented at *Precision and Splendor Exhibition Lecture Series*, held 16th October 2013, at Frick Collection, New York, 2013.
[57] Kevin K. Birth, 'Non-Clocklike Features', op. cit.
[58] Larissa Pschetz, Michelle Bastian, and Chris Speed, 'Temporal design: Looking at Time as Social Coordination', presented at *DRS 2016 Design+Research+Society: Future-focused thinking*, held 27-30 June, at Brighton, UK, 2016.
[59] Carl Honoré, *In Praise of Slow: How a Worldwide Movement is Challenging the Cult Of Speed*, London, Orion, 2005.

[60] e.g. Lars Hallnäs and Johan Redström, 'Slow Technology: Designing for Reflection', *Personal Ubiquitous Computing*, 5, 3 (2001), 201-12.
[61] Carolyn F. Strauss and Alastair Fuad-Luke, 'The Slow Design Principles: A New Interrogative and Reflexive Tool for Design Research and Practice', presented at *Changing the Change Conference*, held 10-12 July 2008, at Turin, Italy, 2008.
[62] Scott Thrift, 'Story - The Present', n.d., Accessed 4th February 2015, at http://www.thepresent.is/videos/
[63] Ibid.
[64] PSFK, 'm ss ng p eces: Changing The Concept Of Time', New York, Vimeo. 2013, at http://vimeo.com/67516461.
[65] MOMA, 'MOMA | Talk to Me | Artificial Biological Clock', New York, 2011, Accessed 5th February 2015, at http://www.moma.org/interactives/exhibitions/2011/talktome/objects/143181/
[66] Larissa Pschetz, op. cit.
[67] Ibid.
[68] Emily Gee and Jeremy Myerson (eds), *Time & Motion: Redefining Working Fife*, Liverpool, University of Liverpool and FACT, 2013.
[69] San Jose Climate Clock Initiative, 'About Climate Clock | Climate Clock', San Jose, n.d., Accessed 5th February 2015, at https://climateclock.wordpress.com/about/about-climate-clock/
[70] PSFK, op. cit.